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Descriptions of Four New Species of Lepidostomatid Caddisflies (Trichoptera) from Honshu, Central Japan

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Abstract Three new species of the *naraensis* group of *Goerodes*, *G. hokurikuensis*, *G. kumanoensis* and *G. kantoensis*, and a new species of the *orientalis* group, *G. semicircularis* are described for males, females, and larvae from small water flows of Honshu, central Japan. Additional records of the species of the two species-groups are given.

Key words: Trichoptera; new species; small water flow; Japan.

The Lepidostomatidae are one of the most intensively studied families of Trichoptera in Japan (ITO *et al.*, 1993). However, taxonomic surveys of the family partly remain for further studies, particularly in small water flows. In this paper, I am going to describe four new species of the *naraensis* and *orientalis* groups of *Goerodes* from small water flows of Honshu, central Japan, and to report collecting records of species of the two species-groups living in similar habitats.

Filiation of adults and larvae was established by rearing larvae to adults, by dissecting mature pupae to examine their genitalic segments, or by examining larval exuviae in pupal cases. The terminology used in this paper follows my previous paper (ITO, 1984). Since general characters of the genus were given by ITO (1984), only specific characters are to be described. Figures are given based on specimens from type localities, unless otherwise indicated. The type specimens are deposited in the collection of the Natural History Museum and Institute, Chiba (CBM–ZI). Other specimens are deposited in the collections of the author (without indication) and of H. MORITA (HM).

Naraensis group of *Goerodes*

Goerodes hokurikuensis n. sp.

(Fig. 1)

Male (Fig. 1 a–h). Body brown and ca. 6.5 mm long. Fore wing (Fig. 1 a) ca. 8.0 mm long and ca. 3.5 mm wide; long setae present on basal half of anterior margin and short setae on whole area; scales scattered on whole area except for marginal area and lined on fold; discoidal and thyridial cells 2.0 mm long and 0.7 mm long, respectively; Cu 2 with a small room at the apex; fold 1/2 as long as

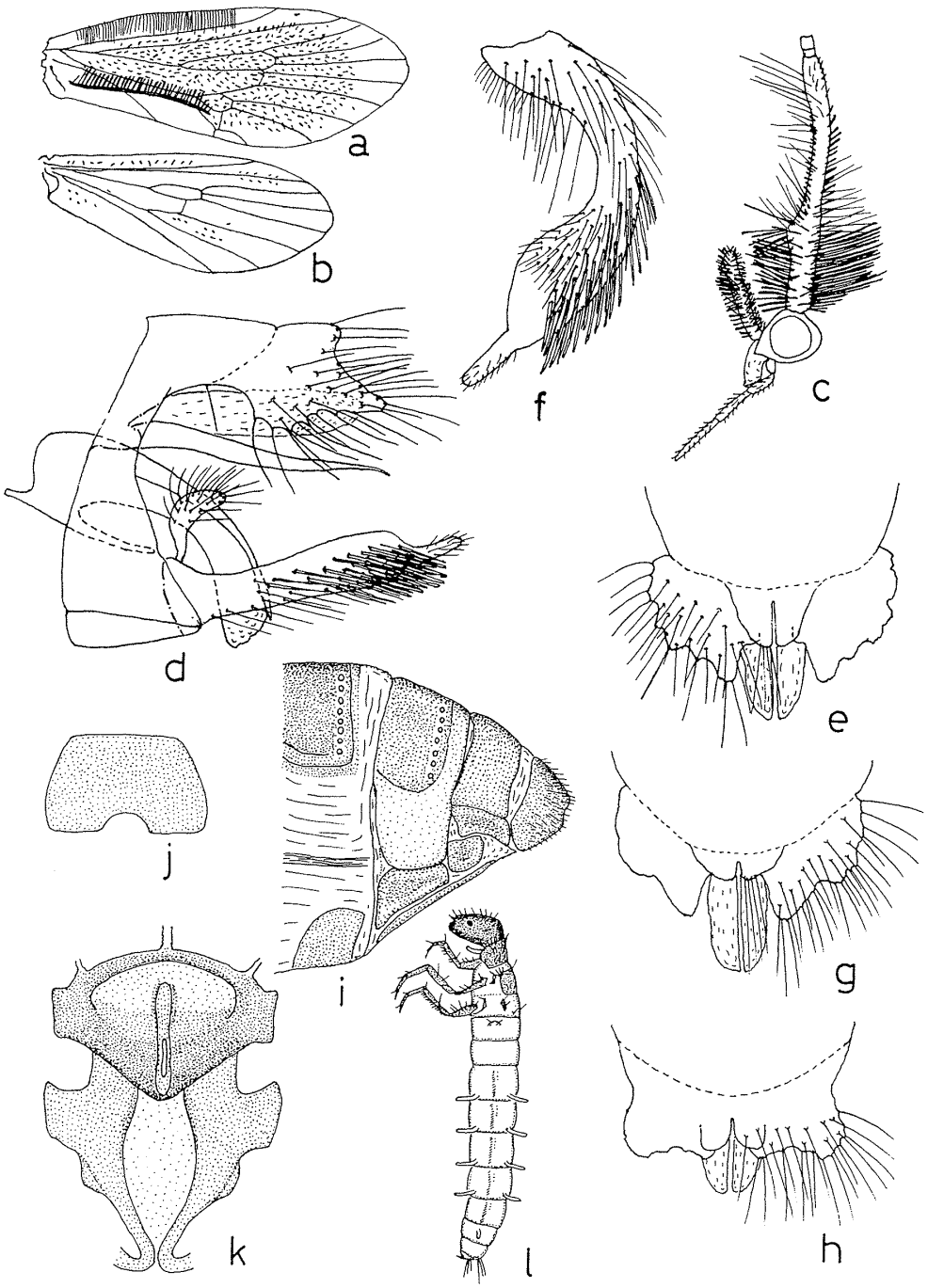

Fig. 1. *Goerodes hokurikuensis* n. sp. Male (a–h): a, fore wing; b, hind wing; c, scape and mouth parts; d, genitalia, lateral view; e, tergite X, dorsal view; f, clasper, ventral view; g, variation of tergite X, Nanao, Ishikawa Pref.; h, same, Saji-son, Tottori Pref. Female (i–k): i, segments VII–X; j, subgenital plate; k, internal apparatus. Final instar larva (l).

wing. Hind wing (Fig. 1 b) ca. 7.0 mm long and ca. 2.8 mm wide; short setae present on whole area and a few scales scattered; discoidal cell 1.2 mm long. Antenna ca. 8.0 mm long. Scape (Fig. 1 c) 2.5 mm long and 4.5 times as long as head; basal 1/3 slightly thicker than apical 2/3; basal 1/3 densely covered with scales and setae; apical 2/3 covered with setae; basal process absent. Maxillary palpus (Fig. 1 c) 2-segmented, 0.9 mm long in total and covered with scales. Labial palpus (Fig. 1 c) 3-segmented, 1.4 mm long in total and covered with setae.

Genitalia (Fig. 1 d–h). Tergite X composed of mesal arm, lateral arm and membranous lobe. Mesal arm (Fig. 1 d, e) consisting of inner and outer lobes; inner lobe small, 1/2 of outer lobe, and triangular with subacute apex; outer lobe large semicircular with irregular margin. Lateral arm (Fig. 1 d) thin, long, as long as mesal arm, and strongly sclerotized. Membranous lobe (Fig. 1 d, e) thick and long, often longer than mesal arm. Aedeagus and parameres (Fig. 1 d) curved ventrally. Basal 6/7 of main article of clasper (Fig. 1 d, f) thick and densely covered withlong, thick setae and long, thin setae; apical 1/7 thin and covered with a few short setae. Superior harpe comb-like and curved dorso-caudally. Dorsal hook, inner hook and inferior harpe absent.

Variation (Fig. 1 g, h). Mesal arms in the specimens from Nanao, Ishikawa Pref., and Saji-son, Tottori Pref., are somewhat different from that in the topotypical ones. In the males from Nanao, the inner lobe of the mesal arm is short, 1/3 as long as the outer lobe (Fig. 1 g). The outer lobe in the male from Saji-son is subsquare in dorsal view (Fig. 1 h).

Female (Fig. 1 i–k). Body brown and ca. 6.5 mm long. Fore wing ca. 8.0 mm long and ca. 2.8 mm wide. Hind wing ca. 6.5 mm long and ca. 2.5 mm wide. Antenna ca. 8.5 mm long. Scape 1.5 mm long and 2.5 times as long as head.

Tergite VIII (Fig. 1 i) not tapered at lateral margin. Lateral plate (Fig. 1 i) subsquare; anterior margin wider than the posterior. Subgenital plate (Fig. 1 j) subsquare; anterior margin straight; posterior margin straight with a median concavity and wider than the anterior; lateral margin gently convex. Tergites IX and X separated.

Internal apparatus (Fig. 1 k). Vaginal apparatus strongly sclerotized and rhomboidal with wide, short lateral projections. Connecting folds with a large square projection at each lateral margin.

Larva. Final instar larva (Fig. 1 l). Head ca. 0.9 mm wide. Body length up to 7 mm. Other characters as in *G. naraensis* (ITO, 1985 b).

Remarks. This species resembles *G. naraensis* (ITO, 1985 b), but differs from the latter in both male and female. The male lateral arm is strongly curved dorsally in *naraensis*, but directed caudad in *hokurikuensis*. The female internal connecting folds bear no lateral projection in *naraensis*, but they have large, square lateral projections in *hokurikuensis*. The larva of *hokurikuensis* is very similar to that of *naraensis* and not distinguishable from the latter in the present study.

Holotype. ♂, Shimo-shinjô, Shin-machi, Imadate, Fukui Pref., 20 m a. s. l.,

10. IV. 1988 (larva), T. ITO (TI), emerged in IV–V. 1988, TI (CBM–ZI 33026).

Paratypes. 1 ♂ 2 ♀, same data as holotype (CBM–ZI 33027~33029).

Other specimens. 1 ♀, same data as holotype. 2 final instar larvae, type locality, 10. IV. 1988, TI. 1 ♂ 2 ♀, type locality, 6. V. 1986, H. NISHIDA. 2 ♂, Toyono-mizu, Nanao-jôshi, Nanao, Ishikawa Pref., 220 m, 10. IV. 1988 (larvae), TI, emerged in IV. 1988, TI. 2 final instar larvae, do., 10. IV. 1988, TI. 1 ♂ 1 ♀, Yodo, Saji-son, Tottori Pref., 16. V. 1993, N. KUHARA.

Case. Cases of the final instar larvae are cylindrical and made of sand grains at first and change to four-sided one of leaf pieces in early half of the instar. At the end of the larval stage, cases are 7–7.5 mm long.

Habitat. The larvae of *G. hokurikuensis* live in narrow (50 cm wide) and shallow (5 cm deep) water flows in forests. Larvae of *Neoseverinia crassicornis* are common there.

Distribution. Honshu (Ishikawa, Fukui, Tottori).

Etymology. The specific name refers to the type locality.

Japanese name. Hokuriku-kakutsutsu-tobikera.

Goerodes kumanoensis n. sp.

(Fig. 2)

Male (Fig. 2 a–f). Body brown and ca. 5.5 mm long. Fore wing (Fig. 2 a) ca. 7.5 mm long and ca. 2.8 mm wide; long setae present on basal 1/4 of anterior margin and short setae on whole area; scales scattered on the whole except for marginal area and densely lined on fold; discoidal and thyridial cells 2.0 mm long and 4.0 mm long, respectively; fold 1/2 as long as wing. Hing wing (Fig. 2 b) ca. 6.0 mm long and ca. 2.3 mm wide; a few scales present; discoidal cell 0.8 mm long. Antenna ca. 7 mm long. Scape (Fig. 2 c) 1.8 mm long and 4.5 times as long as head; basal half slightly thicker than apical half and densely covered with scales and setae; apical half covered with setae; basal process absent. Maxillary palpus (Fig. 2 c) unsegmented, 0.9 mm long and covered with scales and setae. Labial palpus (Fig. 2 c) 3-segmented, 1.0 mm long in total and covered with setae.

Genitalia (Fig. 2 d–f). Mesal arm (Fig. 2 d, e) short, triangular with a middle slit in dorsal view, small hump-shaped in lateral view. Lateral arm (Fig. 2 d, e) directed dorso-caudad, slightly longer than mesal arm and acute at apex. Membranous lobe (Fig. 2 d, e) as long as lateral arm. Aedeagus and parameres (Fig. 2 d) curved ventrally; apex of paramere ax-shaped. Main article of clasper (Fig. 2 d, f) thick in basal 5/6 and thin in apical 1/6. Superior harpe (Fig. 2 d) long comb-like and directed dorso-caudally. Dorsal hook, inner hook and inferior harpe absent.

Female (Fig. 2 g–i). Body brown and ca. 5.5 mm long. Fore wing ca. 7.0 mm long and ca. 2.5 mm wide. Hind wing ca. 6.0 mm long and ca. 2.2 mm wide. Antenna ca. 7.3 mm long. Scape 1.5 mm long and 3.5 times as long as head.

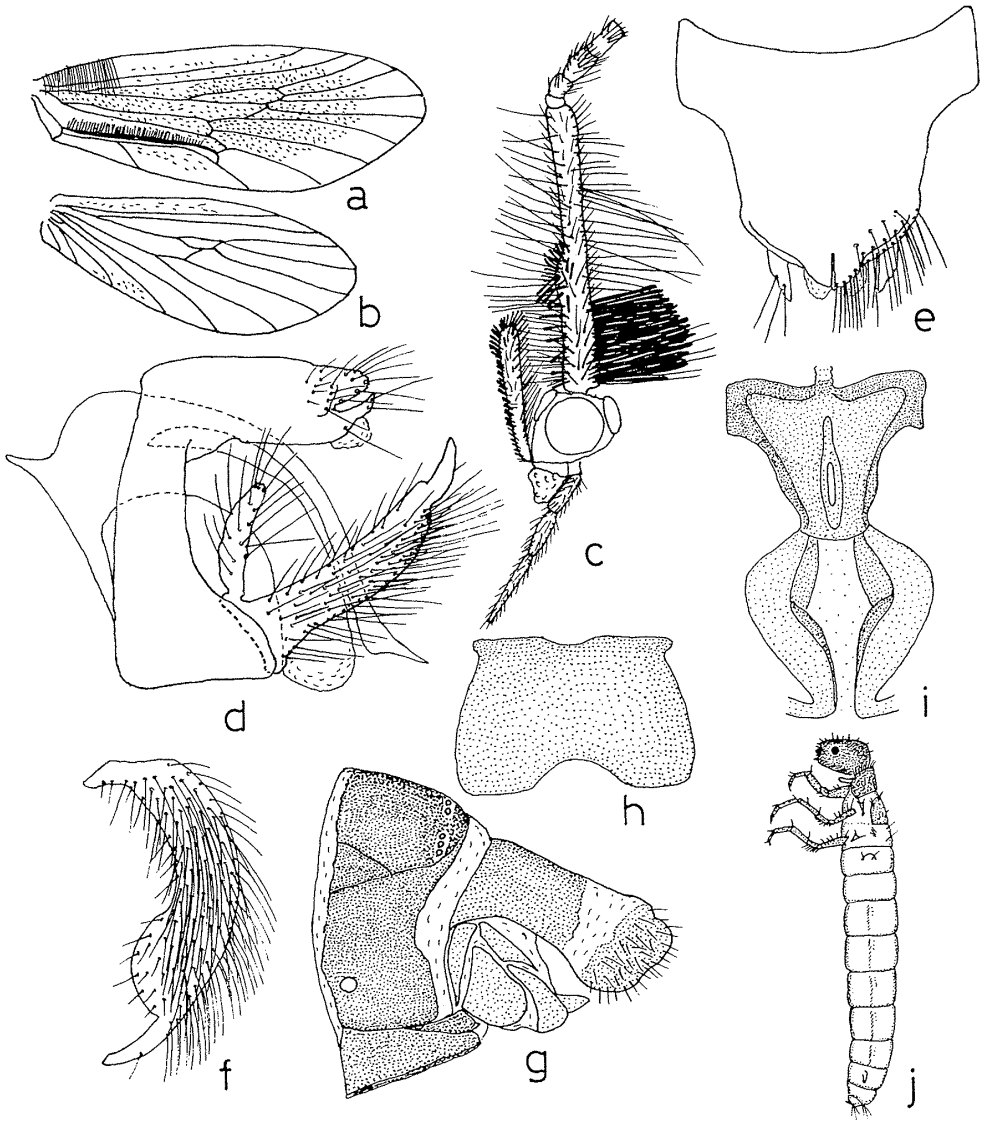

Fig. 2. *Goerodes kumanoensis* n. sp. Male (a–f): a, fore wing; b, hind wing; c, scape and mouth parts; d, genitalia, lateral view; e, tergites IX–X, dorsal view; f, clasper, ventral view. Female (g–i): g, segments VIII–X; h, subgenital plate; i, internal apparatus. Final instar larva (j).

Tergite VIII (Fig. 2 g) not tapered at lateral end and with a light dot near each antero-lateral corner. Lateral plate (Fig. 2 g) subtriangular with round caudal apex. Subgenital plate (Fig. 2 h) subsquare; anterior margin straight with a shallow median concavity; posterior margin also straight with a large median concavity; lateral margin gently convex posteriorly. Tergites IX and X separated (Fig. 2 g).

Internal apparatus (Fig. 2 i). Vaginal apparatus subsquare; anterior margin wide, 3 times as wide as posterior margin; small lateral projections present near antero-lateral corners. Connecting folds and lateral bands oval in form and less

sclerotized than vaginal apparatus.

Larva. Final instar larva (Fig. 2 j). Head ca. 0.8 mm wide. Body length up to 7 mm. Abdominal gill completely absent. Other characters as in *G. naraensis* (ITO, 1985 b).

Remarks. This species resembles *G. naraensis* (ITO, 1985 b), but differs from the latter in male, female and larva. The male lateral arm is long and strongly curved dorsally in *naraensis*, but short and directed caudad in *kumanoensis*. The female vaginal apparatus is rhomboidal in *naraensis*, but subsquare in *kumanoensis*. Abdominal gills are present on segments III to VI in the larva of *naraensis*, but completely absent in that of *kumanoensis*.

Holotype. 1 ♂, Yanoko-tôge-shita, Kumano, Mie Pref., 500 m, 19. II. 1990 (larva), TI, emerged in IV–V. 1990, TI (CBM–ZI 33030).

Paratypes. 5 ♂ 5 ♀, same data as holotype (CBM–ZI 33031～33040). 4 final instar larvae, type locality, 19. II. 1990, TI (CBM–ZI 33041～33044).

Other specimens. Type locality: 2 ♂ 2 ♀, 4. V. 1989, H. MORITA (HM); 2 final instar larvae, 19 .II. 1990, TI (HM); 20 final instar larvae, 19. II. 1990, TI; 6 ♂ 12 ♀, 31. X. 1991 (larvae), K. OKAZAKI, K. SAITO, N. KUHARA, Y. NAGAYASU & TI, emerged in IV. 1992, TI. 9 ♂ 7 ♀, Exp. Forest of Mie Univ., Okitsu, Mie Pref., 530 m, 1. XI. 1991 (larvae), TI, emerged in IV. 1992, TI. 2 pupae (♂) 1 final instar larva, do., 1. XI. 1991 (larvae), TI, fixed with alcohol in IV. 1992, TI.

Case. Cases of the final instar larvae are cylindrical and made of sand grains at first and change to four-sided cases of leaf pieces in early half of the instar. At the end of the final instar, cases are ca. 7 mm long.

Habitat. The larvae of *G. kumanoensis* live in small (5 m wide) mountain brooks. Small number of larvae of *G. japonicus* and *N. crassicornis* were also found there.

Distribution. Honshu (Mie).

Etymology. The specific name refers to the type locality.

Japanese name. Kumano-kakutsutsu-tobikera.

Goerodes kantoensis n. sp.

(Fig. 3)

Male (Fig. 3 a–e). Body brown and ca. 6 mm long. Fore wing (Fig. 3 a) ca. 7.0 mm long and ca. 2.5 mm wide; long setae present on basal 1/3 of anterior margin and short one on whole area; scales scattered around basal 2/5 of middle area; discoidal and thyridial cells 2.1 mm long and 2.6 mm long, respectively. Hind wing (Fig. 3 b) ca. 5.5 mm long and ca. 2.0 mm wide; a few scales scattered near base; discoidal cell short, 0.9 mm long. Antenna ca. 7.5 mm long. Scape (Fig. 3 c) 1.4 mm long and 3.5 times as long as head; inner margin slightly protrudent at the middle; basal half covered with scales and setae; apical half covered with setae; basal process absent. Maxillary palpus (Fig. 3 c) unsegmented, 0.6 mm

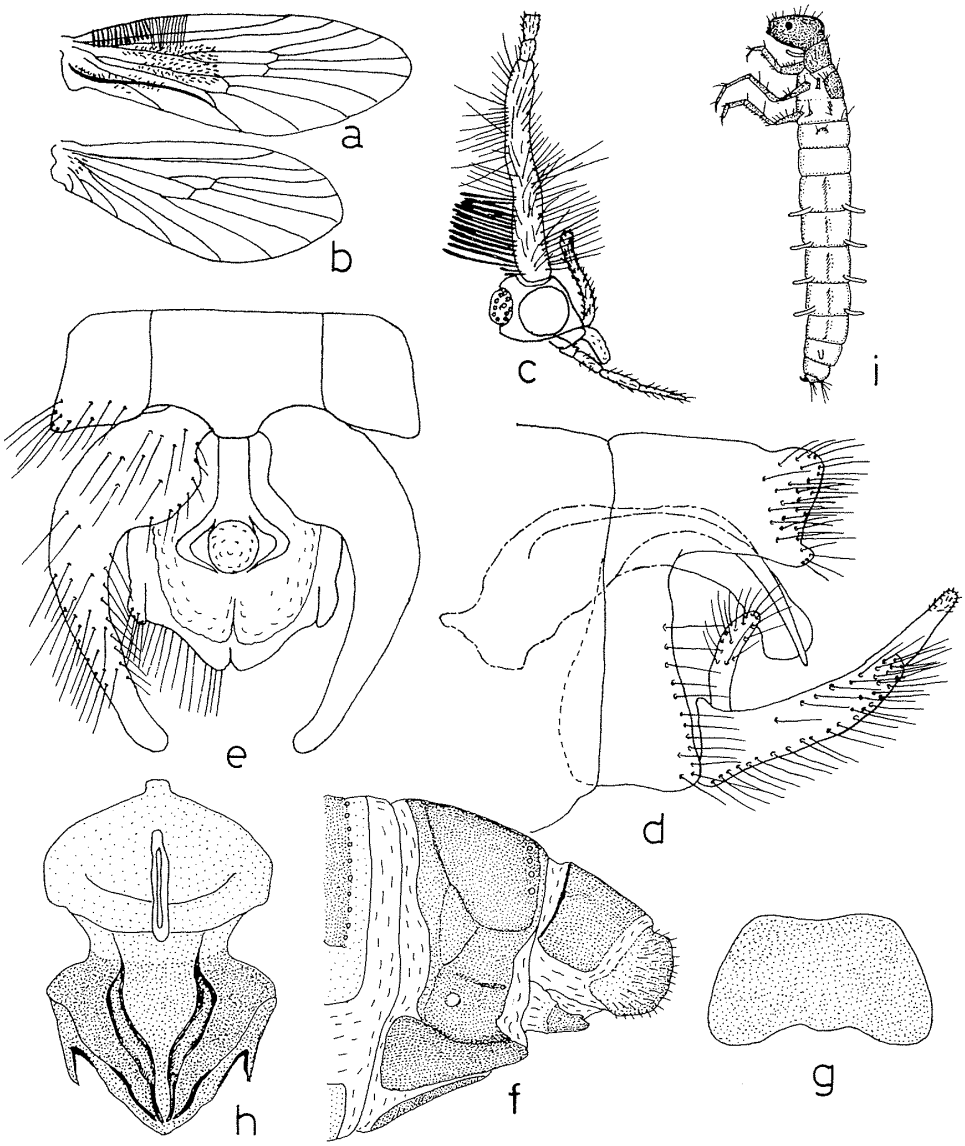

Fig. 3. *Goerodes kantoensis* n. sp. Male (a–e): a, fore wing; b, hind wing; c, scape and mouth parts; d, genitalia, lateral view; e, same, ventral view. Female (f–h): f, segments VII–X; g, subgenital plate; h, internal apparatus. Final instar larva (i).

long and covered with scales and setae. Labial palpus (Fig. 3 c) 3-segmented, 0.8 mm long in total and covered with setae.

Genitalia (Fig. 3 d, e). Mesal arm (Fig. 3 d, e) roof-shaped with a shallow middle slit in dorsal and ventral views. Lateral arm (Fig. 3 d, e) short, its basal 4/5 being fused with ventro-lateral margin of mesal arm. Membranous lobe (Fig. 3 e) broad and shorter than mesal arm. Aedeagus and parameres (Fig. 3 d, e) curved ventrally. Main article of clasper (Fig. 3 d, e) gradually tapered from

base to apex. Superior harpe (Fig. 3 d) directed dorsad at first and slightly curved caudally in apical half. Dorsal hook, inner hook and inferior harpe absent.

Female (Fig. 3 f–h). Body brown and ca. 6.5 mm long. Fore wing ca. 7.5 mm long and ca. 2.5 mm wide. Hind wing ca. 6.0 mm long and ca. 2.2 mm wide. Antenna ca. 8 mm long. Scape 1.3 mm long and 2.5 times as long as head.

Tergite VIII (Fig. 3 f) not tapered at lateral margin and a light dot present near each antero-lateral corner. Lateral plate (Fig. 3 f) long triangular with subacute corners. Subgenital plate (Fig. 3 g) subsquare; anterior margin narrower than the posterior; anterior and posterior margins gently concave. Tergites IX and X separated (Fig. 3 f).

Internal apparatus (Fig. 3 h). Vaginal apparatus rhomboidal and weakly sclerotized. Lateral projection not developed. Connecting folds and outer margin of lateral bands heavily sclerotized.

Larva. Final instar larva (Fig. 3 i). Head 0.95 mm wide. Body length up to 7 mm. Numerous short spines present on whole area of dorsum of head. Other characters as in *G. naraensis* (Ito, 1985 b).

Remarks. This species resembles *G. naraensis* (Ito, 1985 b), but differs from the latter in male, female and larva. The male lateral arm is strongly curved dorsally in *naraensis*, but short and straight in *kantoensis*. The female vaginal apparatus is more sclerotized than connecting folds in *naraensis*, but less sclerotized in *kantoensis*. Short spines on head are absent in the final instar larva of *naraensis*, but present in that of *kantoensis*.

Holotype. 1 ♂, Shôgen-tôge-shita, Ichinose, Enzan, Yamanashi Pref., 1,280 m, 13. II. 1992 (larva), S. Uchida & TI, emerged on 14. IV. 1992, TI (CBM–ZI 33045).

Paratypes. 1 ♂ 1 ♀, type locality, 9. VI. 1992 (larvae), T. Nozaki, T. Kagaya & TI, emerged in VI. 1992, TI (CBM–ZI 33046～33047).

Other specimens. 1 final instar larva, type locality, 23. III. 1993, T. Nozaki, H. Kusano & TI. 2 ♀, do., 23. III. 1993 (larvae), T. Nozaki, H. Kusano & TI, emerged in V. 1993, TI. 1 ♂, Ôhikage-zawa, Yanagisawa River, Enzan, Yamanashi Pref., 1,580 m, 6. VI. 1991, T. Nozaki. 1 ♂, Shiroiwa-zawa, Kita-akigawa River, Hinohara-mura, Tokyo, 550 m, 19. IV. 1991 (pupa), T. Nozaki, emerged on 24–25. IV. 1991, T. Nozaki. 1 ♀, Kanoto-iwa, Kanoto River, Hinohara-mura, Tokyo, 450 m, 19. IV. 1991 (larva), T. Nozaki, emerged in IV–V. 1991, T. Nozaki. 1 pupa (♂), Kozakashizawa, Hinohara-mura, Tokyo, 320 m, 24. III. 1993 (larva), T. Nozaki & TI, fixed with alcohol in IV. 1993, TI. 4 ♂, spring stream near Jigoku-zawa, Shôbuga-hama, Nikkô, Tochigi Pref., 1,320 m, 26. V. 1979, TI.

Case. Cases of final instar larvae are cylindrical and made of sand grains at first and change to four-sided cases of leaf pieces in early half of the instar. At the end of the final instar, cases are ca. 8 mm long.

Habitat. The larvae of this species live in shallow (2 cm) and narrow (30 cm) water flow where fallen leaves and mosses are abundant. Larvae of *N. crassicornis*,

G. naraensis and other lepidostomatids are often found there.

Distribution. Honshu (Tochigi, Tokyo, Yamanashi).

Etymology. The specific name refers to the area of distribution.

Japanese name. Kanto-kakutsutsu-tobikera.

Goerodes naraensis (TANI)

Crunobiodes naraensis TANI, 1971, 58–60, ♂, wings of ♀.

Goerodes naraensis: ITO, 1984, 507–514; ITO, 1985 b, 199–210, geographical variation of ♂, ♀, larva, case, habitat, life cycle.

Specimens examined. 3 ♂, Kumbetsu, Shibetsu-chô, Hokkaido, 40 m, 7. VI. 1992, N. KUHARA. 2 ♂ 1 ♀ 2 pupae (♂), Magi-keikoku, Ôta-chô, Akita Pref., 254 m, 7. X. 1990 (larvae), TI, emereged and fixed with alcohol in V. 1991, TI. 1 ♂ 1 ♀, Mts. Azuma, Yonezawa, Yamagata Pref., 740 m., 19. V. 1992, T. SHIMIZU. 1 ♂, Minami-asagawa River, 15. II. 1992 (larva), T. NOZAKI & TI, emerged in IV. 1992, TI. 1 pupa (♂), Shiroiwa-zawa, Kurakake, Tokyo, 550 m, 14. VI. 1989, T. KAGAYA. 1 ♂ 5 ♀, do., 19. IV. 1991 (larvae), T. NOZAKI, emerged in V–VI. 1991, T. NOZAKI. 10 ♂ 5 ♀ 5 pupae (2 ♂ 3 ♀), do., 14. II. 1992 (larvae), T. NOZAKI, T. KAGAYA, S. UCHIDA & TI, emerged and fixed with alcohol, TI. 1 ♂ 2 ♀ 1 pupa (♂), Kozakashi-zawa, Hinohara-mura, Tokyo, 320 m, 14. II. 1992 (larvae), T. NOZAKI, T. KAGAYA, S. UCHIDA & TI, emerged and fixed with alcohol, TI. 1 pupa (♂), Yazawa, Hinohara-mura, Tokyo, 430 m, 14. II. 1992, T. NOZAKI, T. KAGAYA & TI. 1 ♂, do., 24. III. 1993 (larva), T. NOZAKI & TI, emerged in V. 1993, TI. 3 ♂ 2 ♀, Ôhikage-zawa, Yanagisawa River, Enzan, Yamanashi Pref., 1,580 m, 12. II. 1992, T. NOZAKI, T. KAGAYA, S. UCHIDA & TI, emerged in V. 1992, TI. 1 ♂ 3 ♀ 3 pupae (1 ♂ 2 ♀), small tributary of Shiraishi-zawa, Yamakita-machi, Kanagawa Pref., 22.XI.1989 (larvae), T. NOZAKI & TI, emerged and fixed with alcohol in V–VI. 1990, TI. 10 ♂ 14 ♀ 5 pupae (2 ♂ 3 ♀), do., 3. V. 1990, T. NOZAKI. 1 pupa (♂), do., 10. VI. 1992, T. NOZAKI, T. KAGAYA & TI. 5 ♂, Ôno, Nachi-katsuura-chô, Wakayama Pref., 160 m, 30. X. 1992 (larvae), K. OKAZAKI, K. SAITO, Y. NAGAYASU & TI, emerged in V. 1993, TI. 2 ♀, Sandankyô, Togochi-chô, Hiroshima Pref., 24. V. 1993, N. KUHARA. 1 ♂, Nakanotani River, Sekigane-chô, Tottori Pref., 760 m, 3. V. 1992, T. SHIMIZU. 11 ♂ 2 ♀, Nozoe, Sekigane-chô, Tottori Pref., 400 m, 3. V. 1992, T. SHIMIZU. 1 ♂, Hikosan, Soeda-chô, Fukuoka Pref., 650 m, 26–28. IV. 1993, TI. 1 ♂ 1 ♀, do., 19. V. 1993, N. KUHARA. 1 ♂, source of Nishiyama River, Une-chô, Ôita Pref., 23. V. 1993, N. KUHARA. 4 ♂ 3 ♀, Mt. Tara-dake, Taira-chô, Ôita Pref., 600–800 m, 18. X. 1992, N. KUHARA. 2 ♂, Tomochi-machi, Kumamoto Pref., 21. V. 1993, N. KUHARA.

Distribution. Kunashir, Hokkaido (Nemuro, Sorachi, Ishikari, Shiribeshi, Oshima), Honshu (Akita, Iwate, Yamagata, Niigata, Tochigi, Gumma, Tokyo, Kanagawa, Yamanashi, Nagano, Wakayama, Shiga, Nara, Hyôgo, Okayama, Hiroshima, Tottori), Kyushu (Fukuoka, Ôita, Saga, Kumamoto).

Goerodes axis ITO

Goerodes axis ITO, 1985 c, 512–515, ♂, ♀, larva, case, habitat.

Specimens examined. 6 ♂ 1 ♀, foot of Mt. Hyônosen, Sekinomiya-chô, Hyôgo Pref., 15. V. 1993, Y. SAKAMAKI. 1 ♂, a tributary of Tenjin River, Misasa-chô, Tottori Pref., 16. V. 1993, N. KUHARA.

Distribution. Honshu (Aichi, Hyôgo, Tottori).

Orientalis* group of *Goerodes

Goerodes semicircularis n. sp.

(Fig. 4)

Male (Fig. 4 a–j). Body brown and ca. 6.5 mm long. Fore wing (Fig. 4 a) ca. 8.0 mm long and ca. 2.8 mm wide; short setae present on whole area; scales scattered except for caudal area and lined on Cu; discoidal and thyridial cells 2.0 mm long and 3.5 mm long, respectively; fold long, 3/4 as long as wing, and along Cu. Hind wing (Fig. 4 b) ca. 7.0 mm long and ca. 2.5 mm wide; a few scales scattered on anterior half and short setae present on the whole area; discoidal cell 0.8 mm long. Antenna ca. 10 mm long. Scape (Fig. 4 c) 1.2 mm long, 1.8 times as long as head. A basal process present on dorso-mesal side of scape (Fig. 4 c, d), 0.5 mm long, 2/5 as long as scape; a middle branch, 5–6 long setae and a sclerotized board arranged on apical half of inner margin. Maxillary palpus (Fig. 4 c) 3-segmented and 1.4 mm long in total. Labial palpus (Fig. 4 c) 3-segmented and 1.1 mm long in total. Both palpi covered with short setae.

Genitalia (Fig. 4 e–j). Tergite X composed of mesal arm, lateral arm and membranous lobe. Mesal arm (Fig. 4 e, g) thin, bar-shaped and elongated caudally. Lateral arm asymmetrical. Left lateral arm (Fig. 4 e) thin, long bar-shaped with a short branch and a semicircular plate on the ventral side of base. Right lateral arm (Fig. 4 f) also thin, long bar-shaped with a semicircular plate on ventral side; a short branch absent. Both left and right lateral arms twice as long as mesal arm; directed caudad at first and gently curved ventrally in apical half. Membranous lobe (Fig. 4 e, g) a little shorter than mesal arm. Aedeagus curved ventrally. Paramere absent. Main article of clasper (Fig. 4 e, h) thick at basal 5/7. Apical 2/7 of clasper divided into dorsal and ventral hooks; dorsal hook leaf-shaped and ventral hook bar-shaped. Superior harpe thin and long, directed dorsad at first and then curved caudally. Inner hook and inferior harpe absent.

Variation (Fig. 4 i, j). The right lateral arms in the specimens from Mikawa-mura, Niigata Pref., and Kyôwa-machi, Akita Pref., are somewhat different from those of topotypical ones. The right arm in the male from Mikawa-mura is bifurcated at the apex (Fig. 4 i), while it is acute at the apex and reduced on the dorsal margin in the male from Kyôwa-machi (Fig. 4 j).

Female (Fig. 4 k–m). Body brown and ca. 7.0 mm long. Fore wing ca. 8.5 mm

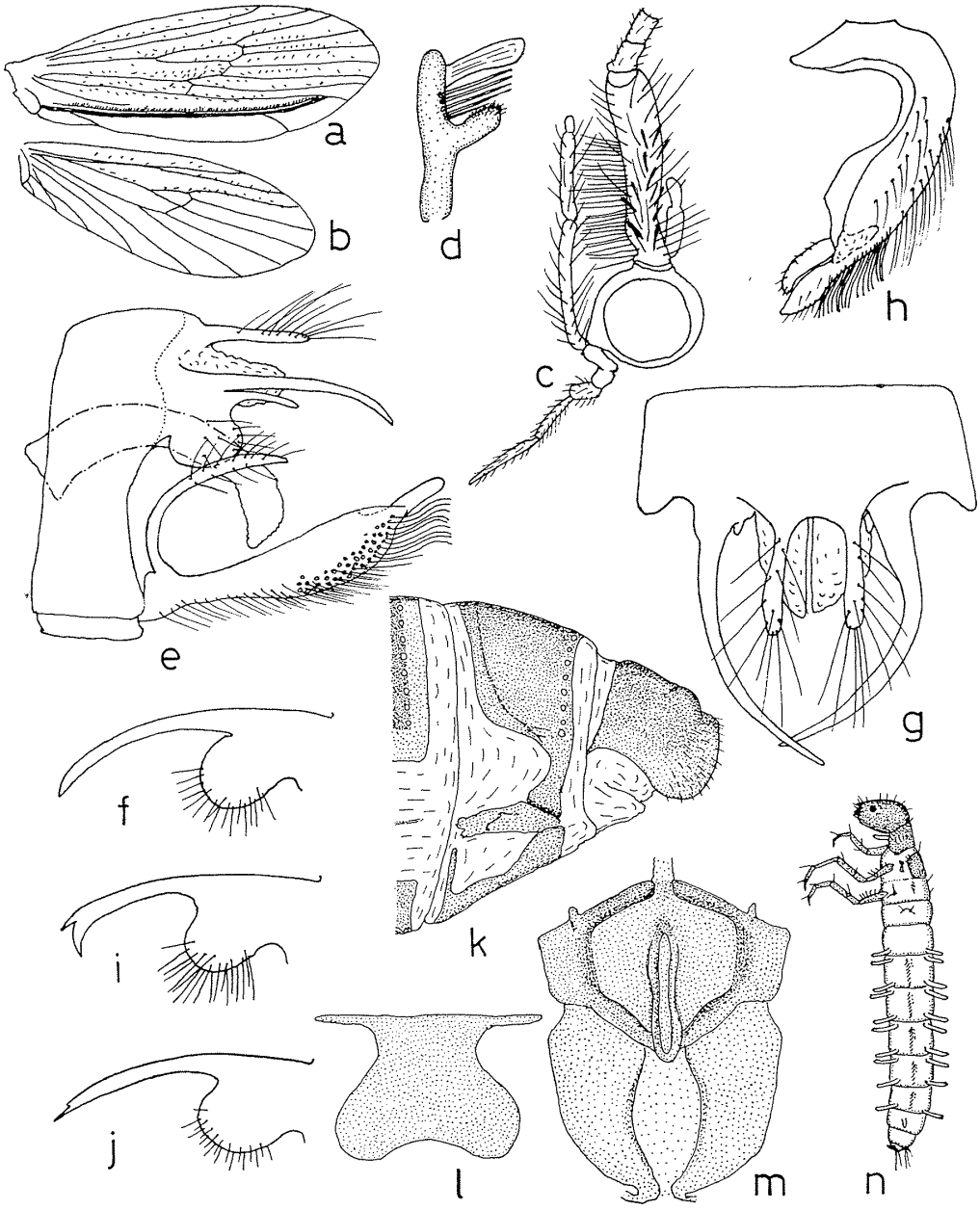

Fig. 4. *Goerodes semicircularis* n. sp. Male (a–j): a, fore wing; b, hind wing; c, scape and mouth parts; d, basal process of left scape, dorsal view; e, genitalia; f, right lateral arm; g, tergites IX–X; h, clasper, dorsal view; i, variation of right lateral arm, Mikawa-mura, Niigata Pref.; j, same, Kyowa-machi, Akita Pref. Female (k–m): k, segments VII–X; l, subgenital plate; m, internal apparatus. Final instar larva (n).

long and ca. 3.0 mm wide. Hind wing ca. 7.0 mm long and ca. 2.3 mm wide. Antenna ca. 9.0 mm long. Scape 1.2 mm long and twice as long as head.

Tergite VIII (Fig. 4 k) strongly tapered near lateral magin and a little broadened

at lateral end, again. Lateral plate (Fig. 4 k) long rectangular with irregular margin. Subgenital plate (Fig. 4 l) trapezoidal with thin lateral projection at the anterior part. Tergites IX and X fused.

Internal apparatus (Fig. 4 m). Vaginal apparatus rhomboidal with broad lateral projections. Connecting folds less sclerotized than vaginal apparatus.

Larva. Final instar larva (Fig. 4 n). Head 0.80–1.00 mm wide. Body length up to 9.5 mm. Other characters as in *G. tsudai* (Ito, 1985 a).

Remarks. This species closely resembles *G. tsudai* (Tani, 1971), but differs from the latter in the male. The male lateral arm is bar-shaped without projection in *G. tsudai*, but bar-shaped with a large semicircular plate in this species. Female and larva of this species are similar to those of *G. tsudai*, and not distinguishable from the latter in the present study.

Holotype. ♂, Kami-noguchi, Shimizu, Nakasen-chô, Akita Pref., 62 m, III–IV. 1985 (larva), K. Aoya, emerged in V–VI. 1985, K. Aoya (CBM–ZI 33048).

Paratypes. ♀, same data as holotype, (CBM–ZI 33049). 4 final instar larvae, type locality, 7. X. 1990, TI (CBM–ZI 33050～33053). 2 ♂, Tsurugasaka, Aomori, Aomori Pref., N. Kuhara (CBM–ZI 33054～33055).

Other specimens. Type locality: 1 ♂, same data as holotype; 1 pupa (♂) 7 final instar larvae, VI–VII. 1985, K. Aoya; 1 ♀ 4 pupae (2 ♂ 2 ♀), 7. X. 1990, TI; 31 5th, 34 4th, 8 3rd, 1 2nd and 1 1st instar larvae, 7. X. 1990, TI. 1 ♂ 1 ♀, Miyata, Kyôwa-machi, Akita Pref., 9. X. 1990, T. Nozaki. 1 ♂, Tsurugasaka, Aomori Pref., 29. IX. 1992, N. Kuhara. Igashima, Mikawa-mura, Niigata Pref. (specimens from this locality were misidentified by Ito (1985 a) with *G. tsudai*): 1 ♂ 15 final instar larvae, 28. IV. 1981, TI; 3 ♂ 1 ♀, 28. IV. 1981 (egg mass), TI, emerged in XI. 1981, TI; 9 ♂ 1 ♀, 28. VI. 1981 (larvae), emerged in VII–VIII. 1981, TI.

Case. Cases of the 1st and 2nd instar larvae are cylindrical and made of sand grains. Cases of the 3rd instar larvae are also of sand and cylindrical at first, and change to four-sided ones of leaf pieces in the course of the instar. Cases of the 4th and 5th instar larvae are four-sided leaf ones. Case length is up to 9 mm in the specimens from Mikawa-mura, Niigata Pref., and 22 mm in those of the type locality.

Habitat. Larvae of this species live in small water flows (2.5 m wide) on low mountains and lowlands, where many water plants, such as *Ranunculus* sp. and *Nasturtium* sp., are often grown.

Distribution. Honshu (Aomori, Akita, Niigata).

Etymology. The specific name refers to the shape of the projection of lateral arm.

Japanese name. Han'en-kakutsutsu-tobikera.

Goerodes tsudai (Tani)

Yamatopsyche tsudai Tani, 1971, 55–58, ♂, wings of ♀.

Goerodes tsudai: Ito, 1984, 507–514; Ito, 1985 a, 19–29, ♂, ♀, pupa, larva, case, habitat; Ito, 1990, 791.

Specimens examined. 3 ♂, Daishôji-onsen, Kaga, Ishikawa Pref., 22–23. IV. 1991, T. SHIMIZU. 1 ♂ 1 ♀, Hasami-dani, Kumabashiri-chô, Ishikawa Pref., 7. V. 1991, T. SHIMIZU. 4 ♂ 1 ♀, Ôtsuboi, Tsubata-chô, Ishikawa Pref., 11. V. 1992, T. SHIMIZU. 2 ♂, Kamihiruzen, Kawakami-mura, Okayama Pref., 650 m, 3. V. 1992, T. SHIMIZU. 2 ♂, small stream near Myôren River, Kawakami-mura, Okayama Pref., 2. V. 1992, T. SHIMIZU. 1 ♂, Asai, Sekigane-chô, Tottori Pref., 300 m, 3. V. 1993, T. SHIMIZU. 2 ♂ 1 ♀, Kenkyô-tôge-shita, Sekigane-chô, Tottori Pref., 500 m, 3. V. 1992, T. SHIMIZU. 1 ♂, Nakanotani River, Sekigane-chô, Tottori Pref., 760 m, 3. V. 1992, T. SHIMIZU. 3 ♂, Izumitani River, Sekigane-chô, 400 m, 3. V. 1992, T. SHIMIZU. 1 ♂, tributary of Nogami River, Yanaka, Mizoguchi-chô, Tottori Pref., 17. V. 1993, N. KUHARA. 1 ♂, Funaya River, Kôfu-chô, Tottori Pref., 750 m, 25. V. 1993, N. KUHARA. 1 ♂, tributary of Tenjin River, Misasa-chô, 16. V. 1993, N. KUHARA. 1 ♂, tributary of Kando River, Ottate, Izumo, Shimane Pref., 17. V. 1993, N. KUHARA. 1 ♂ 1 ♀, Fujiki, Ôta, Shimane Pref., 300 m, 29. IV. 1992, T. SHIMIZU. 1 ♂, upper reach of Nagafuchi River, Kuzuha, Ume-chô, Ôita Pref., 23. V. 1993, N. KUHARA. 1 ♂ 1 ♀, affluent of Kinrin Lake, Yufuin-chô, Ôita Pref., 15. X. 1992, N. KUHARA.

Distribution. Honshu (Niigata, Shizuoka, Nagano, Ishikawa, Fukui, Shiga, Nara, Okayama, Tottori, Shimane), Kyushu (Fukuoka, Ôita).

Goerodes orientalis (TSUDA)

Crunoeciella orientalis TSUDA, 1942, 329–331, ♂, wings of ♀; TANI, 1971, 51–52, ♂, wings of ♀.
"*Crunoeciella*" *orientalis*: MALICKY, 1979, 10–101.
Goerodes orientalis: ITO, 1984, 507–514; ITO, 1985 a, 16–19, ♀, pupa, larva, case, habitat; MEY, 1989, 304; ITO, 1990, 790; KUMANSKI & WEAVER, 1992, 166, ♂, ♀.

Specimens examined. 1 pupa (♂), small stream, Takada, Shingû, Wakayama Pref., 15. XII. 1990 (larva), K. OKAZAKI, fixed with alcohol on 16. I. 1991, TI. 1 ♀, Yoshii River, Yoshii-machi, Okayama Pref., 5. XI. 1991, Y. NAGAYASU, emerged in I. 1992, TI.

Distribution. Honshu (Tokyo, Shizuoka, Wakayama, Shiga, Nara, Kyoto, Okayama), Sado, Shikoku (Tokushima), Kyushu (Fukuoka), Tsushima, Korea (Kangvŏn, Phyŏngan Hamdo), China (Yunnan, Sichuan).

Goerodes hiurai (TANI)

Crunoeciella hiurai TANI, 1971, 53–54, ♂, wings of ♀.
"*Crunoeciella*" *hiurai*: MALICKY, 1979, 100–101.
Goerodes hiurai: ITO, 1984, 507–514; ITO, 1985 a, 12–16, ♀, pupa, larva, case, habitat, life cycle; ITO, 1990, 791; ITO *et al.*, 1992, 601.

Specimens examined. Uenae River, Tomakomai, Hokkaido: 6 ♂ 1 ♀, 9. VI. 1989, N. KUHARA; 3 ♂ 3 ♀, 29. V. 1991, TI. Bibi River, Misawa, Tomakomai, Hokkaido: 6. VII. 1989, N. KUHARA; 18 ♂ 10 ♀, 29. VIII. 1992, N. KUHARA; 1 ♂, 4. V. 1992 (pupa), TI, emerged on 12. V. 1992, TI. Small tributary of Bibi River,

Misawa, Tomakomai, Hokkaido: 3 ♂, 24. V. 1992, TI; 7 ♂ 1 ♀, 4. VI. 1992, TI; 5 ♂ 2 ♀, 20. VI. 1992, TI; 2 ♂ 2 ♀, 4. VII. 1992, TI; 6 ♂ 7 ♀, 17. VII. 1992, TI; 3 ♂ 3 ♀, 1. VIII. 1992, N. Kuhara; 2 ♂, 15. VIII. 1992, N. Kuhara; 33 ♂ 10 ♀, 13–15. IX. 1992, TI & Y. Nagayasu; 3 ♂ 1 ♀, 1. X. 1992, TI.

Distribution. Amur-Ussuri River Basin, Sakhalin, Iturup, Kunashir, Hokkaido (Sôya, Sorachi, Rumoi, Kushiro, Tokachi, Hidaka, Iburi, Shiribeshi).

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